

C 3304

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fifth Semester

(Regulation 2004)

Mechanical Engineering

ME 1305 — APPLIED HYDRAULICS AND PNEUMATICS

(Common to BE (Part-Time) Fourth Semester Regulation-2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any four applications of fluid power systems.
2. What are the minor energy losses in pipes?
3. What are the advantages of positive displacement pumps?
4. Write the classifications of hydraulic motors?
5. Draw the symbol of simple pressure relief valve.
6. Write any four applications of accumulators.
7. What is the function of reservoir in a pneumatic system?
8. What is meant by interlock contacts?
9. What are proportional control valves?
10. List the probable causes for the problem of leakage of compressed air in pneumatic systems?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the functions of a fluid in any fluid power system? (4)
- (ii) Compare the various characteristics of the liquid and gaseous fluid in fluid power system. (4)
- (iii) Enumerate the properties that a good hydraulic fluid should possess. (8)

Or

- (b) Compare and contrast between hydraulic, pneumatic, and electromechanical power systems. (16)
12. (a) (i) Define
- (1) Volumetric efficiency, (2)
- (2) Mechanical efficiency, (2)
- (3) Overall efficiency of a hydraulic pump (2)
- (ii) A pump has a displacement of 80 cm³. It delivers 1.25 Lps at 1200 rpm and 75 bar. If the prime mover input torque is 110 N-m,
- (1) Find the overall efficiency of the pump. (5)
- (2) What is the theoretical torque required to operate the pump? (5)

Or

- (b) (i) A double acting cylinder is hooked up in regenerative circuit as shown in fig.(a).The relief valve setting is 105 bar .The piston area is 130 cm² and the rod area is 65 cm². If the pump flow is 0.0016 m³/s, find the cylinder speed and load carrying capacity for

- (1) Extending stroke, (5)
- (2) Retracting stroke. (5)

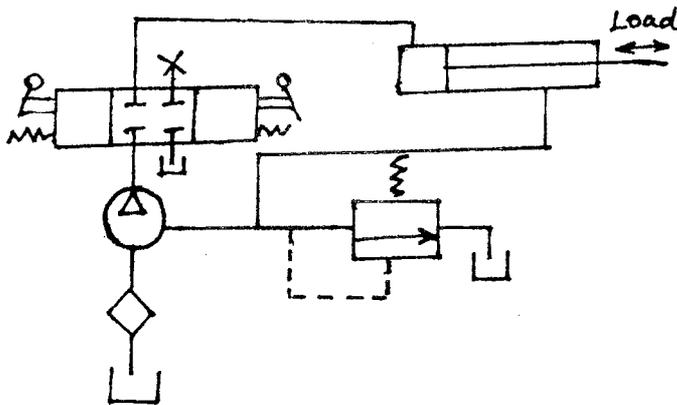


Fig. (a)

- (ii) Explain the working principle of a telescoping cylinder with neat diagram (6)
13. (a) (i) Draw and Explain the working of a direct acting pressure reducing valve with neat diagram (8)
- (ii) With a neat sketch, explain the construction and operation of a pilot operated sequence valve. (8)

Or

- (b) (i) What is fail-safe circuit? With suitable diagram, explain two-handed safety circuit. (12)
- (ii) Enumerate four methods of actuation of hydraulic control valves. (4)
14. (a) (i) Discuss the construction and working principle of a Rotary vane air compressor (8)
- (ii) (1) Calculate the required size of a receiver that must supply air to a pneumatic system consuming 0.85 standard m^3/min for 8 min between 10 bar and 7 bar before the compressor resumes operation. (4)
- (2) What size of receiver is required if the compressor is running and delivering air at 0.2 standard m^3/min (4)

Or

- (b) Develop an electropneumatic circuit by cascade method for the following sequence : A+ B+ B⁻ A⁻ , Where A and B stands for cylinders, (+) indicates extension and (-) indicates retraction of cylinders. (16)

15. (a) (i) Explain the working principle of a PLC with a neat block diagram. What are the advantages of PLC? (12)
- (ii) How does PLC differs from Micro processor? (4)

Or

- (b) Enlist the various faults, probable causes and also the remedial actions for the following pneumatic system components. (16)
- (i) Compressor (ii) FRL unit,
- (iii) Air cylinder (iv) Pipelines.
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